CRDI Community & Regional Development Institute
Department of Development Sociology
Cornell University

ISSUE NUMBER 74/AUGUST 2016

Research & Policy Brief Series

Living with Water: Integrating Community Sustainability and Resilience

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What is the Issue?

Over half of the world's human population now lives in urban areas, and an estimated 30% to 40% of greenhouse gases produced worldwide are attributed to cities[1]. While cities are major drivers of environmental and social change in global systems, their geography and density also make them vulnerable to stressors ranging from climate change and pollution to chronic poverty and crime. The problem is particularly acute in thousands of smaller U.S. cities that lack the technical and fiscal capacity to strengthen their aging social and infrastructure systems. Understanding the resilience of cities can help inform and guide local governments onto a more sustainable trajectory of development.

Binghamton's Living with Water Initiative

In Binghamton, New York, the Rust to Green Binghamton (R2GB) program connects academic and community partners on initiatives to foster greater resiliency and sustainable development. The Living with Water initiative is the first project of R2GB, and it brings together a collective of government officials, community organization leaders, university partners, and artists to focus on community flood resilience.

Living with Water's emphasis on local voice and empowerment as well as its action research methodology has given rise to a project that supports community decision making. The initiative's purpose is to understand and build capacity for sustainable and resilient upstate communities and to preserve the natural and human resources therein. As an urban, mid-sized, post-industrial, upstate city, Binghamton offers an optimal place for researching flood resiliency. The city experienced major floods in 2006 and 2011 which caused significant damage to housing and municipal infrastructure. In 2011, Broome County (which includes Binghamton) and neighboring Tioga County suffered an estimated $1 billion in damages from Tropical Storm Lee.

The Living with Water project seeks to provide a mutually beneficial partnership between universities, extension outreach, and local governments that allows deeper research and collective problem solving. In addition, this work will demonstrate how to integrate resiliency and sustainability concepts into a community development context. Overall, the project partners hope to model in Binghamton a new way of thinking about flood resiliency and living with water across upstate New York.

Cornell University Living with Water faculty, staff, and summer interns; community partners from the City of Binghamton, Binghamton University, and Cornell Cooperative Extension Broome County; and Mahidol University (Thailand) exchange program faculty and students standing at Confluence Park, where the Chenango and Susquehanna rivers meet in Binghamton, New York.

Understanding Sustainability and Resilience

In examining urban areas and their futures, resilience and sustainability can be seen as interdependent concepts. *Sustainability* is often described as a normative concept regarding intergenerational equity and balanced development that meets the social, ecological, and environmental needs of the present without impeding the needs of the future. A framework of sustainability discourages myopia in planning by considering the social and ecological demands within and outside of the boundaries of the system of interest, both now and in the future.

Resilience, on the other hand, can be understood as the ability of a system to absorb shocks and reorganize in the face of a disturbance so to maintain its essential structure, function, and identity. The resilience paradigm conceives social-ecological systems as complex adaptive systems. Uncertainty and change are essential features of systems to be embraced rather than prevented.

While resilience has been identified as a key property of sustainable cities, and the two terms are sometimes used synonymously, they are different concepts in practice. For example, while sustainability often focuses on efficiency in resource use or density in development to reduce ecological

[1] Satterthwaite, D. (2010). The Contribution of Cities to Global Warming and their Potential Contributions to Solutions. *Environment and Urbanization Asia*, 1(1), 1–12.

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footprints, resilience espouses the importance of diversity and redundancy for providing options to buffer against surprises, as well as modularity (or loose connectivity) to limit the transmission of shocks across a system. Clarifying the differences between these concepts and integrating them can facilitate planning, design, and governance that move communities towards desirable states of human well-being, ecological integrity, and social or cross-generational equity.

"Rust belt" or post-industrial cities like Binghamton provide opportunities for integrating the concepts of sustainability and resilience in practice. For example, rust belt cities have a large number of underutilized buildings that can cause blight and hinder reinvestment. At the same time, they have available space for urban agriculture, community greenspaces, alternative energy generation, stormwater management, and other "green" functions that might be less feasible in denser cities with high land values. Therefore, rust belt cities can be seen as being in the midst of a period of reorganization, or what C.S. Holling's ecological resilience theory terms a post-disturbance "adaptive cycle."[2] They are primed for new learning and for developing and adopting new models of decision making that promote greater sustainability and resilience through collaborative and cross-sector environmental planning and design.

Action Research and Narrative Inquiry

As a part of R2GB's Living with Water initiative[3], several research and extension projects began in the summer of 2014. These projects lay the groundwork for building the capacity of local government and communities to develop resilience to flooding in Binghamton. Living with Water has been convening regular meetings with a growing community-university network to guide and develop research and engagement efforts. Broome County Cooperative Extension plays an integral role and acts as a catalyst for much of the collaboration. The project engages students from Cornell University and Binghamton University, and has plans for expanding student engagement in the future.

The goal is to develop a planning framework for identifying community assets contributing to urban resilience and sustainability. Through the ongoing university-community dialogues, Living with Water was designed as an action research project with narrative inquiry as one of its primary research methods. Students and partners conducted interviews and story circles with people who had experienced Binghamton's two floods. In 2015, 22 individuals—including leaders from organizations serving low-income and underserved populations—were interviewed. Moving forward, interviews and focus groups are underway to engage a larger cross section of citizenry.

Early Findings

To date, the interviews are providing new insights regarding how communities engage with flood risk as well as learn, adapt, and reframe their approaches and relationships to flooding. Preliminary analysis indicates several challenges, including the difficulties government officials face as they try to balance community needs, desires, and the ecological realities of living in a floodplain. Highly vulnerable to flooding are the elderly, poor, youth, and people with disabilities. The psychological trauma, fear, and stress of flood experiences take a significant toll on individuals and communities. The rich personal stories emerging from Living with Water are inspiring efforts to involve the arts community in generating community theater, using stories to engender dialogue and learning related to living with water.

The interviews also reveal evidence of community adaptations that further buoy resilience. Changes enacted in municipal flood planning approaches and protocols following the 2006 storm enabled a better coordinated response to the 2011 flood. People favor "rebuilding smarter" over simply rebuilding, and are articulating the need to share and develop greater community knowledge, memory, and identity around flooding. Such valuable post-flood learning and knowledge will advance future adaptive capacity in the Binghamton community.

Next Steps

Project partners are now at work planning public events and educational programs commemorating the 10th and 5th anniversaries of Binghamton's 2006 and 2011 floods. The activities are expected to stimulate greater dialogue and creative thinking among local decision makers and community members. A "Living with Water Summit," to be held in the fall of 2016, aims to increase community awareness of flood risks, preparedness, and response. The summit will identify and advance community-generated and place-based innovations and changes enabling greater resilience and quality of life for people and communities living with water.

Photo: George C. Homsy

View of the City of Binghamton from the Chenango River. Flooding in 2011 affected government office buildings, Binghamton University's downtown campus, and private residences and businesses in the surrounding areas.

The intended outcome of all Living with Water's activities is to provide a model for universities and local governments to collaboratively develop more sustainable and resilient communities in upstate New York. All components of the project work to engage decision makers, residents, and other stakeholders in thinking and working together to create viable options for sustainability and resiliency.

[2] Holling, C. S. 1973. Resilience and stability of ecological systems. *Annual Review of Ecology and Systematics* (4) 2-23.

[3] This work was supported by a joint research and extension program funded by the Cornell University Agricultural Experiment Station (Hatch funds) and Cornell Cooperative Extension (Smith Lever funds) received from the National Institutes for Food and Agriculture, U.S. Department of Agriculture (USDA). Any opinions, findings, conclusions, or recommendations expressed in this publication are those of the authors and do not necessarily reflect the view of the USDA.